

Financial Performance of Tech Companies in the Pandemic and Post-Pandemic Eras

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Author Bio

Seongwon Lee is a junior student at Korea Christian International School. Seongwon has a variety of academic interests. He took courses in Advanced Placement (AP) Environmental Science, AP Macroeconomics, and AP Microeconomics in his first year of high school, and he took courses in AP Statistics, AP Calculus BC, AP Biology, and AP World History in his sophomore year of high school, achieving a cumulative Grade Point Average (GPA) of 4.21. Seongwon is interested in learning statistics and economics, as well as managing those data using computer science. Seongwon is especially passionate about learning how the market functions in various situations, how statistics can be used in different fields, and how those data can be organized using computational methods. Currently, Seongwon has the goal of studying advanced economics and statistics, combined with computer science, in college.

Abstract

The existence of COVID-19 was revealed at the end of December 2019 and was declared a global health emergency in March 2020. Due to its strong ability to disseminate, the pandemic spread all over the world. Because of COVID-19, the basic lifestyles of people changed: online stores, online entertainment, and other online services flourished. During the pandemic, seven tech companies, namely Apple, Amazon, Netflix, Google, Facebook, Tesla, and Microsoft, were able to adapt to the new global trend; therefore, the seven companies grew rapidly. This research paper focuses on analyzing two factors: the performances of the seven companies during the pandemic and after the pandemic, and the future challenges that the companies must face. To assess the performances of the companies during and after the pandemic, Yahoo Finance and ProfitSpi were used to collect the price/earnings (P/E) ratio, daily stock price, market capitalization, and revenue of the seven companies from 2019 to 2022. The data revealed a general trend in the stock prices, in which the prices of the stocks increased from 2019 to late 2021 or early 2022. Unfortunately, the prices of the stocks declined after 2022. These findings show that the performances of the companies were constantly rising until the peak of COVID-19, and started to decline after the peak of the pandemic. These results also indicate that the strong performance of tech companies during the pandemic may not be sustainable after the pandemic, particularly given the challenges of increased competition and more stringent regulations.

Keywords: Amazon, Apple, Big Tech, COVID-19, Facebook, Finance, Google, Meta, Microsoft, Netflix, Stock Market, Tesla

Introduction

Every year, thousands of companies are launched and plenty of companies fall. While there are innumerable public and private companies in the United States, there are only a few companies that can influence the whole market and every other company. FAANG is an excellent example of those highly influential companies. FAANG stands for Facebook, Apple, Amazon, Netflix, and Google, which historically have been five of the highest-growth tech stocks in the United States. As of January 2023, the combined market value of the FAANG companies is \$3 trillion. For comparison, the total market capitalization of the Standard & Poor 500 (S&P 500) is \$31 trillion; this index includes 500 of the largest companies listed on stock exchanges in the United States. Therefore the five FAANG companies are worth approximately 10 percent of the entire stock market of America (FAANG Stocks, 2023). Other well-known companies that influence the whole market include Microsoft and Tesla. One common characteristic of these companies is that they are all tech or tech-related companies; even though Tesla is a car manufacturing company, the vehicle is highly dependent on software, and the market valuation of Tesla is comparable to that of tech companies and far exceeds that of other automotive companies.

The tech or tech-related companies had a huge turning point: COVID-19. The COVID-19 pandemic started in December 2019, became a global health emergency as declared by the World Health Organization in January 2020, and completely changed the world. With the virus' ability to readily spread through the air, along with the high case fatality rate, about 102 million Americans contracted COVID-19 and about 1.1 million Americans died (CDC Covid Data tracker). Due to the COVID-19 pandemic, people started to change their lifestyles. People began to spend more time on entertainment and started to use online stores instead of retail stores for food purchases (Li et al., 2021). The amount of time people spend online increased to 16 hours per day, up from 12 hours per day pre-pandemic (Wolf, 2020). In addition, the way people work changed dramatically. The keyword for the new working trend was 'teleworking'. Instead of going to a company building, people chose to work at home. To conduct conferences and meetings, employees started to use online meeting services such

as Zoom. Since people began teleworking, the amount of time people spend at home has increased drastically.

Because the lifestyles of ordinary people changed, companies had to adjust to the new trend. The seven tech companies (FAANG plus Tesla and Microsoft) were the companies that were able to adjust to the new trend quickly and efficiently. While many businesses that relied on in-person services faltered during the pandemic, these seven tech companies not only survived but thrived. The purpose of this study is to examine the trajectories of these seven tech companies before, during, and after the COVID-19 pandemic, and identify potential factors that contributed to the companies' successes and failures. Specifically, this study will examine the stock price, market cap, and revenue of the selected seven tech companies before, during, and after the COVID-19 pandemic. The research focuses not only on how the seven companies were able to adapt to the new trend and grow during the pandemic but also on how the companies performed after the peak of the pandemic.

Methods

Performance data were gathered for seven companies according to their stock symbols: Amazon (AMZN), Apple (AAPL), Google (GOOGL), Facebook (Meta), Microsoft (MSFT), Tesla (TSLA), and Netflix (NFLX). To measure performance, the daily opening prices, daily highs, daily lows, daily closing prices, and trading volumes for shares of the seven companies and the S&P 500 were tracked from January 1, 2019, to December 31, 2022, in Yahoo Finance (Yahoo Finance). Based on these data, the average, standard deviation, variance, coefficient of variation, and index of dispersion were computed for each metric on a yearly basis from 2019 through 2022.

Using data from profitspi (profitspi), the market capitalizations, revenues, and price-to-earnings ratios were tracked on a quarterly basis for each of the seven companies from the first quarter of 2019 to the fourth quarter of 2022. Quarters in which these metrics exhibited high volatility were identified. Financial news updates about each of the companies were examined to determine possible causes for volatility, high performance, and poor performance.

Results

Table 1 shows the yearly statistical measures of the seven companies and the S&P 500's closing prices. The equation for the coefficient of variation is Standard deviation over mean. As the coefficient of variation increases, data points are more dispersed from the mean. The equation for the index of dispersion is variance divided by the mean.

The average prices of the companies showed a constant rise from 2019 to 2021. Nevertheless, in 2022, the average prices decreased for many tech firms. Only Apple and Tesla had higher average prices in 2022 than in 2021. The statistical analysis also highlights periods when particular companies experienced more price variability and volatility. Specifically, in 2020, Tesla's stock price showed a higher coefficient of variation and a higher index of dispersion than that of any other tech company in our analysis. However, in 2022, Netflix's stock price showed a higher coefficient of variation and a higher index of dispersion than that of any other tech company in our analysis. Therefore, the analysis reveals that while general trends in the tech space are evident, each tech company has experienced its challenges and pattern of stock price variability.

2022	closing								
AVERAGE	4,098.51	126.10	154.84	114.76	180.19	268.92	263.09	284.64	
ST DEVIATION	291.83	23.90	13.06	16.11	56.66	25.76	57.81	94.54	
VARIANCE	85,164.87	571.42	170.46	259.50	3,210.23	663.67	3,342.50	8,938.15	
Coeff Variation	0.07	0.19	0.08	0.14	0.31	0.10	0.22	0.33	
Index Dispersion	20.78	4.53	1.10	2.26	17.82	2.47	12.70	31.40	
	S&P 500	AMAZON	APPLE	GOOGLE	FACEBOOK	MICROSOFT	TESLA	NETFLIX	
2021	closing								
AVERAGE	4,273.39	167.19	140.99	124.23	321.17	275.94	260.00	558.22	
ST DEVIATION	287.44	8.00	14.66	18.33	34.85	36.94	53.74	56.00	
VARIANCE	82,623.95	64.03	214.90	336.06	1,214.80	1,364.58	2,887.91	3,136.27	
Coeff Variation	0.07	0.05	0.10	0.15	0.11	0.13	0.21	0.10	
Index Dispersion	19.34	0.38	1.52	2.71	3.78	4.95	11.11	5.62	
	S&P 500	AMAZON	APPLE	GOOGLE	FACEBOOK	MICROSOFT	TESLA	NETFLIX	
2020	closing								
AVERAGE	3,217.86	134.04	95.35	73.95	234.55	193.03	96.67	446.83	
ST DEVIATION	319.23	27.29	21.81	8.76	38.57	23.00	56.33	65.61	
VARIANCE	101,905.34	744.64	475.67	76.71	1,487.32	528.80	3,173.28	4,305.02	
Coeff Variation	0.10	0.20	0.23	0.12	0.16	0.12	0.58	0.15	
Index Dispersion	31.67	5.56	4.99	1.04	6.34	2.74	32.83	9.64	
	S&P 500	AMAZON	APPLE	GOOGLE	FACEBOOK	MICROSOFT	TESLA	NETFLIX	
2019	closing								
AVERAGE	2,913.36	89.46	52.06	59.56	181.64	130.38	18.24	328.87	
ST DEVIATION	150.67	5.07	8.64	3.99	16.05	14.90	3.54	34.49	
VARIANCE	22,700.94	25.66	74.56	15.92	257.66	222.03	12.50	1,189.53	
Coeff Variation	0.05	0.06	0.17	0.07	0.09	0.11	0.19	0.11	
Index Dispersion	7.79	0.29	1.43	0.27	1.42	1.70	0.69	3.62	
	S&P 500	AMAZON	APPLE	GOOGLE	FACEBOOK	MICROSOFT	TESLA	NETFLIX	

Table 1. Analysis of daily closing prices for seven tech company stocks and S&P 500 from 2019 to 2022. The average, standard deviation, variance, coefficient of variation, and index of dispersion are shown.

Tech. companies comparison							
closing price (\$)	Stock Price 12/31/19	Stock Price 12/31/20	Percent Change	Stock Price 12/31/21	Percent Change	stock price 12/22	Percent Change
S&P 500	3,230.78	3,756.07	16.26%	4766.18	26.89%	3839.50	-19.44%
Amazon	92.39	162.85	76.26%	166.72	2.38%	84.00	-49.62%
Apple	73.41	132.69	80.75%	177.57	33.82%	129.93	-26.83%
Google	66.97	87.63	30.85%	144.85	65.30%	88.23	-39.09%
Facebook	205.25	273.16	33.09%	336.35	23.13%	120.34	-64.22%
Microsoft	157.7	222.42	41.04%	336.32	51.21%	239.82	-28.69%
Tesla	28.09	235.22	737.38%	352.26	49.76%	123.18	-65.03%
Netflix	323.57	540.73	67.11%	602.44	11.41%	294.88	-51.05%
			2019 to 2020		2020 to 2021		2021 to 2022

Table 2. Yearly closing stock prices for seven tech companies and the S&P 500 from 2019 to 2022. Percent changes from previous years are shown.

Table 2 shows the closing prices of the seven companies and the S&P 500 on December 31 from 2019 to 2022. It shows how much the company or the market grew compared to the previous year. It is shown that every one of the seven companies experienced a huge increase from 2019 to 2020, outpacing the S&P 500. While S&P 500 increased only 16 percent from 2019 to 2020, all seven companies increased at least 30 percent. In 2021, S&P 500 increased by about 27 percent compared to the price in 2020. The overall market was having positive growth. Even though the seven tech companies had an increase in stock price from 2020 to 2021, their increase was not as dramatic as that of the previous year except for Microsoft and Google. However, in 2022, the stock price of the seven companies dropped dramatically. The table shows that during the pandemic, the performances of the seven companies were above the market. However, as the pandemic drew to a close, the prices of the seven companies decreased even more than the market did; while the market declined 20 percent, each of the seven companies declined at least 26 percent. Facebook and Tesla decreased by approximately 65 percent, the highest decline out of the seven companies.

P/E Ratio

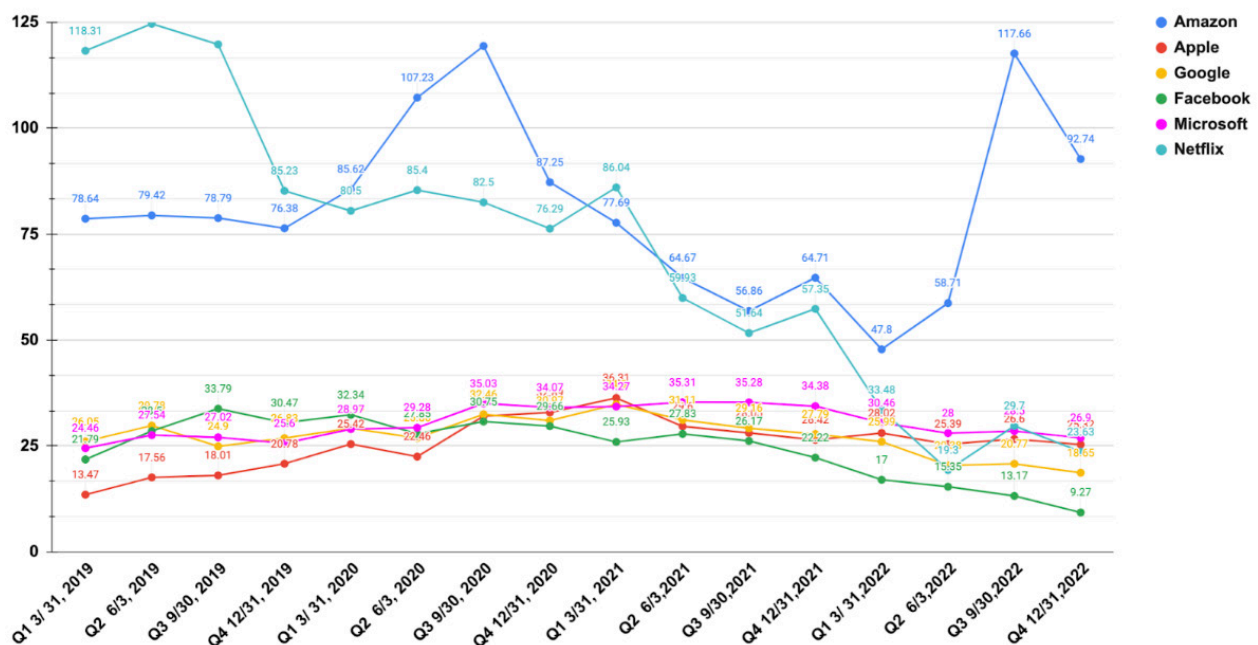


Figure 1. Quarterly price-to-earnings ratios of six tech companies from 2019 to 2022.

Figures 1 and 2 show the price-to-earning (P/E) ratios of the seven companies. The P/E ratio is the ratio of share price to earnings per share. If the P/E ratio is extremely high, it indicates that the company is overvalued. However, at the same time, a high P/E ratio also means that the investors have huge confidence in the company.

Figure 1 shows that Apple, Microsoft, and Google had a similar trend in the P/E ratio. The three companies experienced a constant rise in the P/E ratio before and during the pandemic. However, after the peak of Covid-19 (end of 2021 and the beginning of 2022), each of these companies experienced a slight decline in the P/E ratio. Facebook (Meta) initially looks like it follows the trend of the three above-mentioned companies. However, the peak of Facebook's P/E ratio was in the third quarter of 2019. After the peak, it constantly decreased for 3 years. The peak of Facebook's P/E ratio was about 34, but at the end of 2022, it was only 9. Out of six companies, Amazon and Netflix were the ones that had the highest volatility in the P/E ratio. In the first three quarters of 2019, the P/E ratio of Netflix was above 110. During the pandemic, Netflix demonstrated increases in its P/E ratio, in the first and fourth quarters of 2021. However, the overall trend in Netflix's P/E ratio was downward, and the P/E ratio reached 24 at the end of 2022, a greater than 80% drop from its 2019 peak of 125. Amazon experienced a dramatic increase in P/E ratio twice: in the third quarters of 2020 and 2022. Each of these increases was followed by a decline.

Tesla P/E Ratio

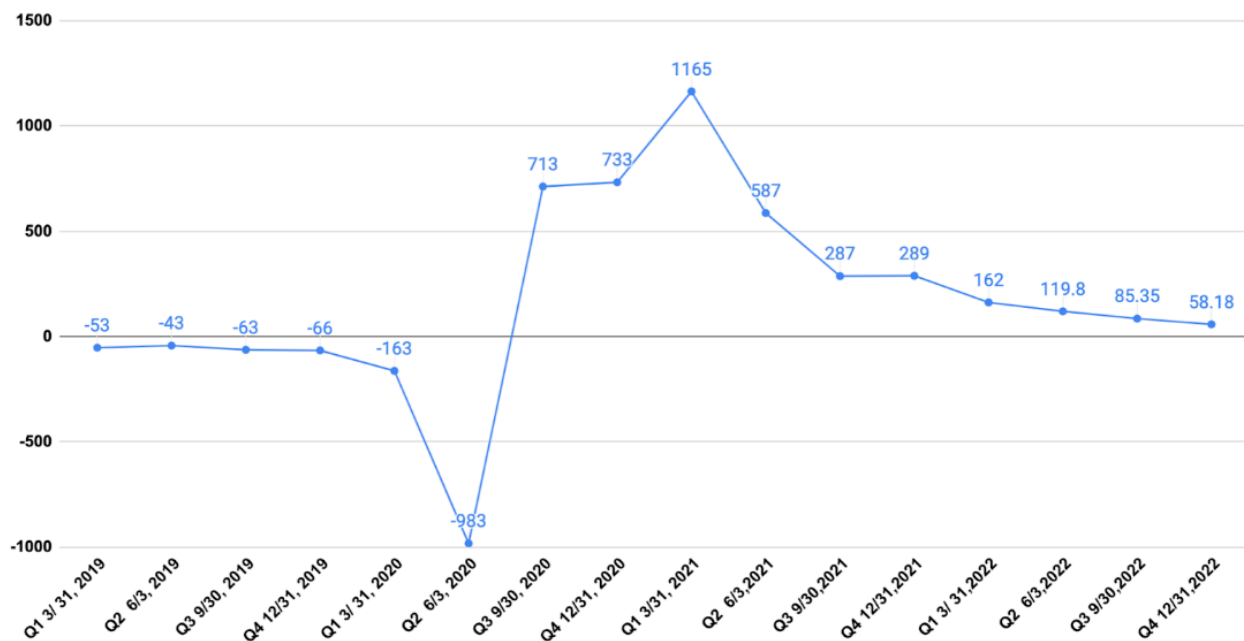


Figure 2. Quarterly price-to-earnings ratios of Tesla from 2019 to 2022.

Figure 2 indicates that among the seven companies, Tesla had the most dramatic changes in the P/E ratio, and its P/E ratio trend is shown on a separate plot for this reason. In 2019, Tesla maintained its P/E ratio of about -50, indicating that the company was not profitable. When Covid-19 shocked the American economy in the second quarter of 2020, Tesla's P/E ratio dropped to -983. However, from the third quarter of 2020, Tesla's P/E ratio started to rise dramatically and eventually reached a peak of 1165 in the first quarter of 2021. Beginning in the second quarter of 2021, the P/E ratio consistently declined. By the end of 2022, Tesla's P/E ratio was 58, a substantial 95% decrease from its peak value.

Market Cap of Amazon, Apple, Google, Facebook, Microsoft...

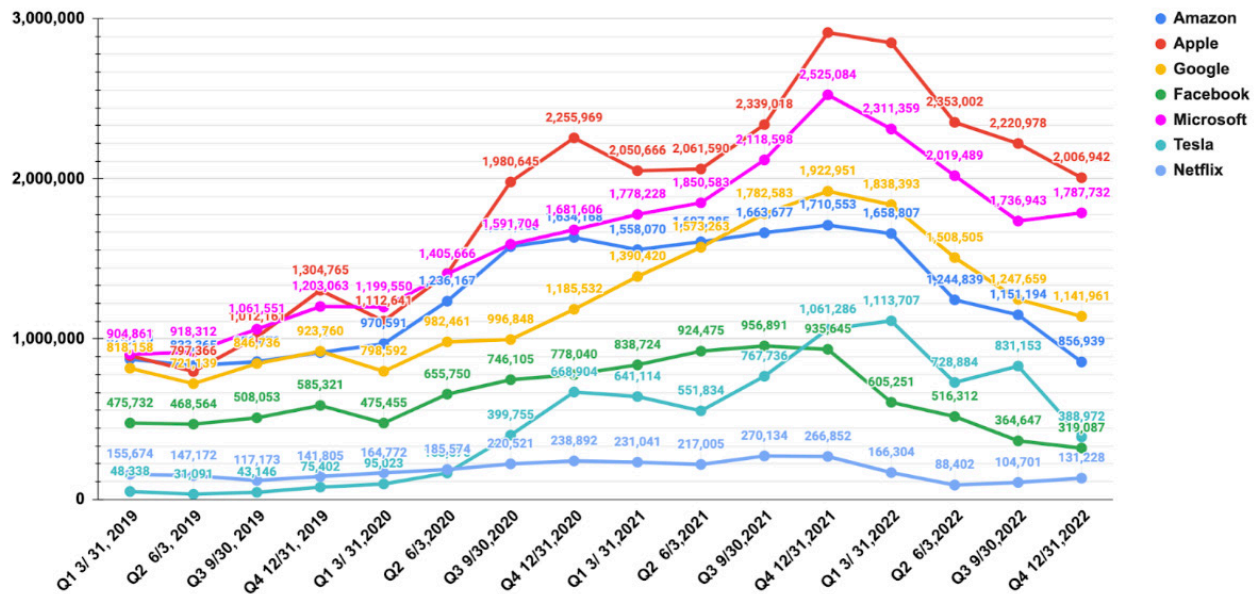


Figure 3. Quarterly market capitalizations (millions) of seven tech companies from 2019 to 2022.

REVENUE

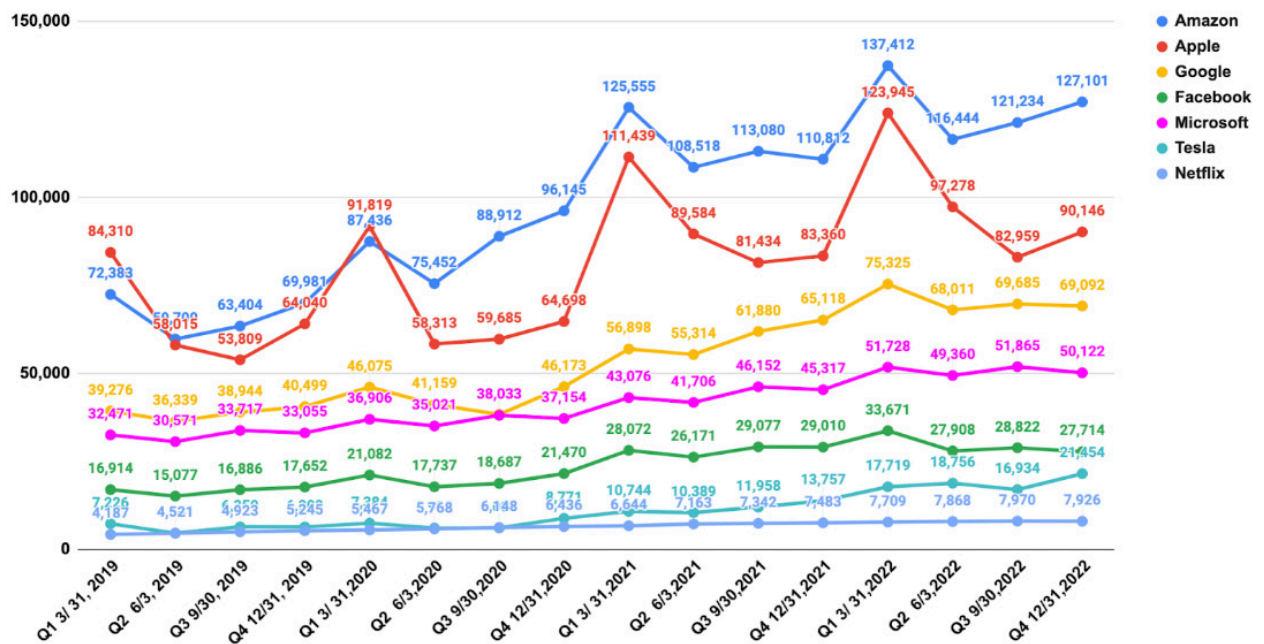


Figure 4. Quarterly revenues (millions) of seven tech companies from 2019 to 2022.

Figure 3 shows the market capitalizations of the seven companies by quarter. The market capitalizations of Netflix, Facebook, and Amazon decreased between the first quarter of 2019 and the last quarter of 2022. Out of the four other companies, Tesla had the biggest increase. The four biggest companies in market cap (Apple, Microsoft, Google, and Amazon) had their highest market cap in the last quarter of 2021. Facebook and Netflix had their peak in the third quarter of 2021, and Tesla had its peak in the first quarter of 2022. Every company had its market cap peak between the end of 2021 and the start of 2022, corresponding to the peak of the COVID-19 pandemic. After the peak of the pandemic, the overall market capitalization of each firm started to decline.

Figure 4 indicates the quarterly revenues of the seven companies. The quarterly revenue of each of the seven companies showed an overall increasing trend from 2019 to 2022. In terms of percentage rise, Tesla had the biggest rise in revenues from 2019 to 2022, an increase of 340%.

Based on Figure 4, there is a general trend on the revenue graph of the seven companies where the revenue of all seven companies increases in every first quarter from 2019 to 2022, and the revenue falls in the second quarter. This trend is especially evident with Amazon and Apple.

Discussion

The FAANG companies now face challenges from rising interest rates, market saturation, intensifying competition, and revaluations for tech stocks in 2023. In particular, Netflix has lagged behind other FAANG companies with regard to reputation and growth.

The market capitalization and the revenue of the seven companies indicate that most of the seven companies successfully adjusted to the new trend caused by COVID-19. However, as the world entered the post-pandemic, new challenges have risen for the seven companies. These challenges include increased competition, price sensitivity of consumers, technological shifts toward artificial intelligence, and an uncertain regulatory landscape, particularly with regard to anti-trust policies and laws. Future research should examine the performance of the stock prices of

these tech firms, to determine the long-term impacts of the pandemic and its aftermath on tech companies.

Netflix and the Challenge of Growing a Subscriber Base

Out of seven companies, Netflix is currently facing the most complex challenges: account sharing and subscriber loss. According to GlobalData, even though 322 million households are watching Netflix, only 222 million users pay for monthly subscriptions. As a solution, Netflix has been trying to charge additionally for users who share their passwords. According to The Spinoff, standard accounts could pay an extra \$7.99 per month for one extra sharing member, and premium users could pay an extra \$15.98 per month for two extra members. Therefore, for one person to share his account with two other people, he has to pay a total of \$40.97 per month which is the most expensive monthly streaming fee in the market. In addition, while Hulu, Spotify, and Amazon provide advantages for student users, the new account policy of Netflix will burden students (NSheidlower, 2023). Currently, the new policy of Netflix for password sharing could not easily lighten the problem. High inflation rate and extreme streaming service competition is causing subscriber loss. In conclusion, for Netflix to overcome new challenges in the post-pandemic era, Netflix must maintain its subscribers and provide a new policy that could solve account sharing.

Facebook, the Metaverse, and the TikTok Threat

Facebook(Meta) is also facing various challenges. To begin with, TikTok, a short video platform launched by ByteDance in 2016, became a strong competitor of Facebook, and TikTok has been gaining attention from a younger user base. As demonstrated by Bankless Times, TikTok has quadrupled its active users since 2018, and in 2023, it is predicted that Tiktok will overtake Facebook within four years(Mukuhi, 2023). While Facebook had an increase of 103 million users from 2021 to 2022, Tiktok had an increase of 319 million users over the same period. In addition, while the main identity of TikTok remains as an entertainment application, it is also functioning as a news source and as social media, so it directly competes with Facebook(Sherman,

2022). As mentioned by Reuters, during the Russian invasion of Ukraine, the number of videos with a #Ukraine tag has increased from 6.4 million to 40 million in Tiktok, informing the world about the situation in Ukraine(Chon, 2022). In October 2022, Facebook announced that its revenue fell four percent due to extreme competition against Tiktok and other companies. Even without the extreme competition, Mark Zuckerberg's miscalculation regarding the metaverse has brought negative consequences. According to Forbes, during the post-pandemic, Mark Zuckerberg assumed that the increasing rate of online usage would persist even after the pandemic(Marr, 2022). Based on his misconception, Zuckerberg made risky investments. During the pandemic, Facebook invested in Reality Lab and XR(Extended Reality). However, the overall performance of Reality Lab was not satisfying for investors. By September 2022, they lost \$13.7 billion, and Facebook is expecting to have a greater loss on functioning Reality Lab in 2023 (Vanian, 2023).

Microsoft and Google in an Era of AI and Antitrust

The two major challenges for Microsoft, Google, and other big tech companies will be new antitrust laws and the appearance of generative AI. According to Harvard Business Review, the American government is focusing on two antitrust issues: Microsoft's acquisition of Activision and Google's advertising businesses(Levin & Downes, 2023). Moreover, the government already tried to regulate Meta's acquisition of VR startups. Even though proving the cases is very difficult, since the government must prove that the actions of the companies are harming the market, it is not necessary for the government to win in order to substantially impact the companies' future outlook. Antitrust issues could damage companies' reputations and operations greatly just by mentioning the possibility of regulation. The antitrust law will make it difficult for companies to have aggressive growth strategies. Not only will the American government try to regulate big tech companies, but also the EU has already constituted laws to regulate the companies. On November 1, 2022, the EU passed the Digital Markets Act. According to the European Commission, the law prevents a few companies that are regarded as 'gatekeepers' from favorably promoting their businesses and providing disadvantages to third parties. The law's primary

purpose is to block tech companies from abusing their market position. If the companies violate the law, the companies must pay fines that go up to 10 percent of their global revenues. The Digital Service Acts could also strongly influence big tech companies. By the Digital Service Acts, companies must clearly show how they determine illegal content. The companies must share their algorithm. The EU believes that the Digital Service Acts and Digital Markets Acts could stimulate companies' competition and growth in the global market, and provide basic rights for the consumers.

The competition between Microsoft and Google on generative AI could be both a challenge and an opportunity for the companies. According to Bloomberg, Google's revenue of \$283 billion mostly comes from advertising and its leading position as a search engine(Milian, 2023). It means that the revenue of Google could greatly decline if Microsoft could present a better search engine. To win the search engine competition, Microsoft will incorporate its generative AI into Bing by using Chat GPT technology. Microsoft has already invested \$10 billion in OpenAI, the maker of Chat GPT. In addition, according to CNN, in March 2023, Microsoft introduced Microsoft 365 Co-pilot which incorporates the technology of Chat GPT into Excel, Word, and PowerPoint(Kelly, 2023). Co-pilot will transcribe meeting notes, summarize emails, create specific charts in Excel, and turn Word documents into presentations in seconds. During the week when Microsoft introduced Chat GPT, Google also announced that it would also provide an AI technology that incorporates its third-party applications such as Gmail, Google Docs, and Google Sheets(Novet, 2023). Overheated Competition in the electric vehicle industry, and Consumers' Response to Elon Musk's Actions

The pandemic might have influenced the company, but not as much as other companies had. It was because Tesla was characterized as a meme stock, not because of the pandemic, but because of Elon Musk. As one of the most famous meme stocks throughout the pandemic, Tesla showed huge volatility. Similar to the situation during the pandemic, the future performances of Tesla will heavily rely on its competitors and Elon Musk's actions.

Tesla is facing intense competition from other companies. Currently, the three largest battery electric vehicle manufacturers are Tesla, Volkswagen, and BYD. BYD, a Chinese vehicle company, may be poised to exceed the sales of Tesla on battery electric vehicles. According to InsideEVs, in the third quarter of 2022, Tesla increased its quarterly sales to 343,830 units (up 42% year-over-year), while BYD increased its quarterly sales to 258,610 (up 182% year-over-year); the gap between the two companies is closing rapidly(Kane, 2022). Not only do BYD and Volkswagen present a threat to Tesla, but other manufacturing companies such as General Motors, Ford, and Hyundai are also focusing on electric vehicle production, which will eventually force Tesla into more competition. The overall situation of the market is not as positive as it used to be before the pandemic; as stated in NPR, while car manufacturers were not able to produce cars due to a lack of parts in 2022, the new challenge in 2023 is that consumers are not willing to buy cars because of high-interest rates(Domonoske, 2023).

There is no doubt that the actions of Elon Musk, especially his purchase of Twitter, will highly affect Tesla. To purchase Twitter, Elon Musk had to sell \$3.95 billion worth of Tesla stock, and as a consequence, the stock price of Tesla declined(Isidore, 2022). Moreover, purchasing Twitter will constantly hurt the image of Tesla in the future; as proof, according to Morningconsult, from October to December 2022, the favorability of Tesla decreased by about 6.2 percent points among U.S. citizens(Marlatt, 2023). More specifically, the favorability declined by about 20 percent among consumers who identified as Democrats, while favorability increased by 4 percent among Republicans. The Twitter purchase has hurt Tesla's brand image in two ways. First, many consumers equate Tesla with Elon Musk, so any decline in consumer perceptions of Musk will necessarily lead to a decline in consumer perceptions of the Tesla product. Second, many investors are concerned that the Twitter purchase will distract Elon Musk from his management responsibilities at Tesla, and the Twitter purchase may create the perception that Tesla is mismanaged. If the brand image constantly worsens due to consumer and investor misgivings about Elon Musk, these concerns will eventually lead to a decrease in the total sales of Tesla.

Amazon and its Rising Competitor

The way people could buy products so quickly and the variety of products consumers could buy allowed Amazon to grow rapidly. Due to its rapid growth, Amazon has been able to take most of the market share of E-commerce, a service where consumers can buy or sell their products online. However, from the beginning of the post-pandemic, Amazon has started to face a strong competitor, Walmart. According to CNBC, to compete against Amazon, Walmart started to use their offline shops as delivery centers that could sell products as well(Repko, 2022). While Amazon does not have plenty of offline infrastructure, Walmart is trying to provide quick delivery service by using its offline infrastructure, drones, and automated system. As a comparison, according to Walmart, by February 2023, it had 4,700 stores and 600 Sam's Clubs all around the United States. However, according to Forbes, Amazon only provides 38 Amazon Fresh and 28 Amazon Go stores(Loeb, 2023). In addition, while the stock price of Amazon decreased 45 percent from November 2021 to November 2022, the shares of Walmart increased about 5 percent over the same period. For Amazon to maintain its position as the leader of the E-commerce business, Amazon must constantly provide a better service than any other competitors, especially Walmart.

However, not only rising competitors will be a challenge for Amazon, but also antitrust law issues will be a burden for the company just like other giant tech companies. Currently, Amazon provides various services including digital content, delivery, retail goods, and even driving. Due to its influence and power in the market, Amazon blocks competition in various fields. That is why the Federal Trade Commission(FTC) is constantly warning Amazon for its antitrust law issues. In September, the FTC sued Amazon for its illegal actions to maintain its influence(Graham, 2023). For Amazon to survive, Amazon must solve a dilemma: to maintain its position, Amazon constantly has to be in various fields, but the government would not allow Amazon to act as a monopoly in different fields.

Apple and its App Store Policy

While Microsoft, Google, and Facebook have been criticized for their antitrust violations, Apple

has been criticized by various companies for its App Store policies. According to Theverge, its criticism started in 2019 with Spotify's first complaint about the policy(Vincent, 2023). Spotify insisted that while Apple could provide services with subscriptions without any costs, Spotify and other applications that provide subscriptions must pay 30 percent of their subscription revenue to Apple(Lovejoy, 2023). In 2023, other CEOs in various tech companies started supporting the complaint of Spotify. Not only Spotify and other tech companies criticize Apple for its policy, but also the game industry criticizes Apple.

A famous instance of the battle between the game industry and Apple is the trial of Apple and Epic Games. On August 14, 2020, Apple announced that Fortnite, a game published by Epic Games, will be deleted from the App Store. The reason for Apple's decision was that Epic Games decided to run its own store so that the users of Epic Games could directly purchase items from Epic Games. Epic Games claimed that users could buy their products at 20 percent lower prices than before(Saifi, 2020). Epic Games started running its store because paying 30 percent of its revenue to Apple was a huge loss for the company.

As a consequence, Epic Games announced that they will going to sue Apple for Anti-trust laws. The first court started on May 3, 2021. Filed on September 13, 2021, case number 21-16506, lawyers for Epic Games stated that Apple has been charging supercompetitive prices for companies, leading to high profits(Epic games, inc.. V. Apple, Inc., no. 21-16506 (9th cir. 2023)). The lawyers also claimed that while other companies are charged heavily by Apple, Apple could maintain its service at a constant price. Therefore, Epic Games strongly argued that Apple has monopoly power.

However, Even though Apple won the case, the battle between Epic Games and Apple was a global issue. It, therefore, made politicians and other companies consider Apple's policies as a monopoly. If Apple maintains its App Store policies in the future, it will cause more incidents similar to that of Epic Games, and affect the brand image of Apple.

Conclusion

The purpose of this research was to analyze how giant tech companies in America performed before the COVID-19 pandemic, during the pandemic, and after the pandemic, to evaluate how effectively the giant tech companies will survive the post-pandemic market. The research primarily focused on examining the companies' stock performance and future challenges that the companies must face. The analysis of stock prices reveals that all seven tech companies experienced constant, rapid growth from 2019 to 2021 (when COVID-19 was at its peak) and started to decline rapidly from 2022 (when COVID-19 started to weaken throughout the world). During the pandemic, all seven companies successfully adapted to the new changes. However, after the pandemic, the stock performance of each company began to decrease, suggesting that the companies' successes could not be sustained after the pandemic. Tech companies must be able to solve future challenges, such as increasing competition, regulatory changes, and technological innovations so that these companies can recover their financial performance.

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